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THE TRANSMISSION OF PLANT VIRUSES BY NEMATODES

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3213—DORST, H. J. M. VAN & HOOF, H. A. VAN., 1965. "*Arabis*-mozaiekvirus bij komkommer in Nederland." *Neth. J. Pl. Path.*, 71 (6), 176–179. [English summary p. 179.]

Xiphinema diversicaudatum was recovered in Holland from soil in glasshouses where cucumbers were infected with arabis mosaic virus (AMV). In long established glasshouses where the soil was regularly steam-sterilized the incidence of AMV was up to 5% and the source of infection was traced to *X. diversicaudatum* in the potting soil. In recently established glasshouses where the incidence of AMV was up to 70%, the soil, previously grassland, was the source of AMV and 22 weeds in the vicinity were shown to be hosts of the virus. [From English summary.] D.W.L.

1226—RASKI, D. J., HEWITT, W. B., GOHEEN, A. C., TAYLOR, C. E. & TAYLOR, R. H., 1965. "Survival of *Xiphinema index* and reservoirs of fanleaf virus in fallowed vineyard soil." *Nematologica*, 11 (3), 349–352. [French summary p. 352.]

An experiment to control fanleaf virus of grape-vines by fallow-rotation was started in California in November 1959. Infected grape-vines were raised 45 cm. below the surface of the soil. Roots of these old vines were recovered at intervals of 4-5 years after the plants were removed. New growth from recovered root pieces yielded fanleaf virus. The nematode vector, *Xiphinema index*, also persisted in the fallow soil diminishing in numbers in correlation with the depletion of surviving roots. The decay of host plant roots may eliminate the virus reservoir and for control of the virus in future plantings a minimum of at least 4 years' rotation is indicated. [A.S.]

1097—HOOF, H. A. VAN & SEINHORST, J. W., 1965. "Onderzoek naar grondvirussen in het boomteeltcentrum Boskoop." *Meded. Dir. Tuinb.*, 28 (5), 256–257. [English summary p. 257.]

Various species of *Ligustrum* at the Boskoop tree-nursery centre were infected with arabis mosaic virus (AMV). Of 60 soil samples examined, *Xiphinema diversicaudatum* was found in 6 and one of these was infected with AMV. 30 of the samples contained *Trichodorus pachydermus* and 15 of these were infected with rattle virus (RV). *T. nannus* occurred in 8 samples, 3 of which were infected with RV, but *T. nannus* did not transmit this virus. A light infestation of *T. pachydermus* was also subsequently found in one of these samples. None of the *Ligustrum* plants collected at 6 localities at Zundert was infected with AMV and *X. diversicaudatum* was not found in soil associated with their roots. D.J.H.

3222—PROESELER, G., 1964. "Die Übertragung pflanzlicher Viren durch Nematoden." *NachrBl. dt. PflSchutzdienst, Berl.*, 18 (2), 31–35. [English & Russian summaries p. 35.]

Transmission of viruses by nematodes is reviewed. D.W.L.

3225—STAUNTON, W. P. & MOORE, J. F., 1967. "The occurrence of arabis mosaic virus and its nematode vector *Xiphinema diversicaudatum* in Ireland." [Correspondence.] *Ir. J. agric. Res.*, 6 (1), 121–122.

The concurrence of *Xiphinema diversicaudatum* and arabis mosaic virus in the Republic of Ireland is reported for the first time. Strawberries and weeds in the New Ross area of Co. Wexford were affected. D.W.L.

1673—HEWITT, W. B. & RASKI, D. J., 1962. "Nematode vectors of plant viruses." In: Maramorosch, K. [Editor], "Biological transmission of disease agents." Symposium of the Entomological Society of America, Atlantic City, 1960. New York and London: Academic Press, pp. 63–72.

The authors discuss principally their published work on the transmission by *Xiphinema index* of a virus causing fanleaf of grapevines [for abstracts see Helm. Abs., 27, No. 268f and 31, No. 221]. Other published accounts of nematode-virus associations are recorded. P.R.T.

3212—DAS, S., 1966. "Virus-vector relationships of grapevine fanleaf virus and its nematode vector *Xiphinema index* Thorne & Allen, 1950." *Diss. Abstr.*, 27 (6), 1690–1691.

3216—FRITZSCHE, R., 1964. "Untersuchungen über die Virusübertragung durch Nematoden." *Wiss. Z. Univ. Rostock*, 13 (2/3), 343–347. [English, French & Russian summaries pp. 346–347.]

Xiphinema diversicaudatum and *X. coxi* transmitted yellow dwarf virus of raspberry in greenhouse tests in Germany. *X. diversicaudatum* also transmitted ray grass mosaic virus but *Pratylenchus* sp. did not. *X. coxi* transmitted rhubarb mosaic virus and cherry leaf roll virus in greenhouse tests and in the field. [From English summary.] D.W.L.

2418—HOOF, H. A. VAN, 1967. "Nematode populations active and inactive with regard to transmission of NEPO viruses." *Nematologica*, Year 1966, 12 (4), 615–618. [German summary p. 618.]

In experiments, virus-free *Xiphinema diversicaudatum* from 6 different sites, acquired arabis mosaic virus (AMV) from bait plants and transmitted it to others. *X. coxi* from 2 sites did not transmit AMV. *Longidorus elongatus* from 4 of 5 sites acquired and transmitted tomato black ring virus (TBRV). *L. caespiticola*, *L. goodeyi*, *L. leptocephalus* and *L. macrosoma* did not transmit TBRV. D.W.L.

2418—HOOF, H. A. VAN, 1967. "Nematode populations active and inactive with regard to transmission of NEPO viruses." *Nematologica*, Year 1966, 12 (4), 615–618. [German summary p. 618.]

In experiments, virus-free *Xiphinema diversicaudatum* from 6 different sites, acquired arabis mosaic virus (AMV) from bait plants and transmitted it to others. *X. coxi* from 2 sites did not transmit AMV. *Longidorus elongatus* from 4 of 5 sites acquired and transmitted tomato black ring virus (TBRV). *L. caespiticola*, *L. goodeyi*, *L. leptocephalus* and *L. macrosoma* did not transmit TBRV. D.W.L.

1159—HARRISON, B. D., 1971. "Some recent work on fungus-transmitted and nematode-transmitted viruses." *British Insecticide and Fungicide Conference (6th), Brighton*, November 15–18, 1971. Proceedings, Vol. 3, pp. 751–757. [En] Scottish Horticultural Research Inst., Invergowrie, Dundee, UK.

Work on prevention of virus diseases of crops by control of the nematode vectors is reviewed. Spraing in potatoes, transmitted by *Trichodorus*, may be controlled in the first season by D-D, dazomet or methomyl. Applications in autumn are more effective than in spring. Numbers of *Trichodorus* increase after the first year. M.T.F.

576—COOPER, J. I.; THOMAS, P. R., 1971. "Chemical treatment of soil to prevent transmission of tobacco rattle virus to potatoes by *Trichodorus* spp." *Ann. appl. Biol.*, 69 (1), 23–34. [En] Scottish Horticultural Research Inst., Invergowrie, Dundee, UK.

Extensive trials were carried out in Scotland to assess the efficacy of 4 nematicides for the control of potato spraing disease caused by tobacco rattle virus, transmitted by *Trichodorus* spp. The experimental dithiocarbamate compound C14421 (Ciba) at 20 lb. per acre failed to prevent the spread of the virus. Methomyl at 8 lb. per acre and dazomet at 150 lb. per acre decreased the spread of the virus in the first, but not in the 2nd year after treatment. D-D at 200 lb. per acre gave good control for 2 years. It was slightly more effective when applied in autumn than in spring. The effect of the chemicals on the virus was related to their nematicidal effect on *Trichodorus*, except methomyl which was more effective against the virus than against the nematode. J.H.B.

2422—MURANT, A. F. & LISTER, R. M.,1967. "Seed-transmission in the ecology of nematode-borne viruses." *Ann. appl. Biol.*, 59 (1), 63–76.

When soils from fields where nematode-borne viruses occurred naturally were air-dried to kill vector nematodes and then moistened, tomato black ring (TBRV) and raspberry ring spot viruses (RRV) occurred commonly in the weed seedlings that grew, but arabis mosaic virus occurred only rarely. Similar tests did not detect tobacco ring spot, grape-vine fanleaf or tobacco rattle viruses in weed seeds in the single soil studied in each instance, although these 3 viruses are also seed-borne in some of their hosts. Discrepancies between the frequency of seed-transmission of viruses from experimentally infected plants and the extent of natural occurrence of infected seed seem largely to reflect the host preferences of the vectors. Infective *Longidorus elongatus* kept in fallow soil retained TBRV and RRV up to only 9 weeks. When weed seeds in the soil were allowed to germinate, the nematodes reacquired virus from the seedlings. A few seeds containing TBRV and RRV were found in soils free of vector nematodes, which suggests that the viruses are disseminated in weed seed and probably explains how TBRV and RRV have reached a large proportion of *L. elongatus* populations in eastern Scotland. [A.S.] D.W.L.

2426—TAYLOR, C. E., 1967. "The multiplication of *Longidorus elongatus* (de Man) on different host plants with reference to virus transmission." *Ann. appl. Biol.*, 59 (2), 275–281.

Several hosts of tomato black ring (TBRV) and raspberry ring spot (RRV) viruses in Scotland were tested as hosts of the vector, *Longidorus elongatus*, because continued transmission of the viruses depends partly on the ability of the vectors to reproduce. Numbers of *L. elongatus* in potted soil at 18°C. increased on *Fragaria vesca*, *Stellaria media*, *Mentha sativa* and *Lolium perenne* at rates of 13 to 18% per week and the nematodes transmitted RRV to *F. vesca* and RRV and TBRV to *S. media*. Numbers of *L. elongatus* increased by about 2% per week on *Ribes nigrum* and *Brassica rapa* var. White globe and the nematodes transmitted TBRV to the latter. Numbers of *L. elongatus* decreased on *Rubus idaeus* vars. Malling Jewel and Lloyd George and in fallow soil, and the nematodes transmitted RRV to Malling Jewel. In a field experiment, numbers of *L. elongatus* increased on strawberry varieties Huxley and Redgauntlet and on *L. perenne*, varied little on gooseberry var. Glencarse Muscat and black currant var. Seabrooks, and decreased on rhubarb and raspberry varieties, Malling Jewel and Lloyd George. Eggs were seen in adult females from May to July and October to December. The many hosts of *L. elongatus* among cultivated plants and weeds and its ability to survive long periods without food, precludes crop rotation as a means of control. Soil fumigation that greatly decreased the numbers of *L. elongatus*, though expensive, is justifiable because *L. elongatus* reproduces slowly even on host plants. D.W.L.

2427—TAYLOR, C. E., THOMAS, P. R. & CONVERSE, R. H., 1966. "An outbreak of arabis mosaic virus and *Xiphinema diversicaudatum* (Micoletzky) in Scotland." *Pl. Path.*, 15 (4), 170–174.

The first natural outbreak of arabis mosaic virus (AMV) in Scotland is reported from the Edinburgh area. The virus was obtained from Malling Promise, Lloyd George, and Norfolk Giant raspberries, previously found to be immune to AMV. The AMV isolate from Malling Promise was found to be serologically similar to a type strain of the virus. The greatest numbers of the nematode vector, *Xiphinema diversicaudatum*, were found in association with roses and Myrobalan plum (*Prunus cerasifera*); fewer were found in the root zone of raspberries. [A.S.] D.W.L.

1599—BETTO, E. & RASKI, D. J., 1966 "Attempts to inoculate *Xiphinema index* with grape fanleaf virus by microinoculation." *Nematologica*, 12 (3), 453–461. [German summary p. 461.]

Techniques and micro-equipment to inoculate *Xiphinema index* with grape fanleaf virus are described. Although the nematodes survived the injury caused by microneedles, later fed on grape seedlings and apparently reproduced normally, there was no evidence from mechanical inoculation tests on *Chenopodium quinoa* that the virus was introduced into adult female *X. index* by microinoculation. [A.S.] D.W.L.

1606—VUITTENEZ, A. & LEGIN, R., 1964. "Recherches sur les vecteurs naturels de la dégénérescence infectieuse. Confirmation de la transmission du virus par *Xiphinema index* (Thorne et Allen) et de l'activité parasitaire de ce nématode sur la vigne." *C. r. hebd. Séanc. Acad. Agric. Fr.*, 50 (3), 286–304. [Discussion pp. 305–306.]

Glasshouse tests showed that *Xiphinema index* is a vector of the "dégénérescence infectieuse" virus of vines. Other ectoparasitic nematodes such as *Xiphinema* II, *X. diversicaudatum*, *Xiphinema* IV, *X. americanum*, *Criconemoides* and *Dorylaimus* species were not vectors. A number of soils from infested and uninfested sites were examined for *X. index* and tested in pots and in the field for their ability to transmit the virus. *Chenopodium quinoa* was used as a test host. Only soil containing *X. index* was virus infested but *X. index* was not always found in soil from infested sites. Frost might eliminate local populations. D.L.T.

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735—HOOF, H. A. VAN, MAAT, D. Z. & SEINHORST, J. W., 1966. "Viruses of the tobacco rattle virus group in northern Italy: their vectors and serological relationships." *Neth. J. Pl. Path.*, 72 (5), 253–258. [Dutch summary pp. 257–258.]

Trichodorus viruliferus, *T. teres*, *T. nanus* and an undescribed *Trichodorus* were found at 60 sites in northern Italy. Tobacco rattle virus (TRV) was isolated from samples of soil from 7 sites by indicator plants in 3 of which *T. viruliferus* was the vector. The 7 virus isolates reacted with an antiserum against a Dutch TRV isolate and were divided into 2 groups according to their reaction with this serum. One isolate from each group was subjected to a more detailed examination. Of these, one was found to be closely related to a Dutch isolate from gladiolus with notched leaf symptoms, while the other showed a distinct relationship to the pea early-browning virus found in Britain. One of the isolates proved to be more closely related to the Dutch TRV than is the Dutch gladiolus isolate. D.W.L.

738—ROGGEN, D. R., 1966. "On the morphology of *Xiphinema index* reared on grape fanleaf virus infected grapes." *Nematologica*, 12 (2), 287–296. [French summary pp. 295–296.]

Experiments with both virus-positive and virus-negative *Xiphinema index* under different environmental osmotic pressures indicated that both groups can adapt to hypotonic and hypertonic environments and that virus-positive nematodes have an increased internal osmotic pressure. Morphological observations and histochemical tests demonstrated additional differences between the virus-positive and virus-negative *X. index*. These observations are discussed in relation to their possible connection with osmoregulation and the localization of the virus. [A.S.] D.W.L.

739—SAUER, N. I., 1966. "Simultaneous association of strains of tobacco ringspot virus within *Xiphinema americanum*." *Phytopathology*, 56 (7), 862–863.

Xiphinema americanum transmitted equally well Y, B and V strains of tobacco ring-spot virus. When they were fed serially on 2 cucumber plants, one containing B strain the other containing V strain, and transferred singly to bait plants, a third of them transmitted both strains regardless of which was acquired first and the others transmitted either one or the other. Similar results were obtained in reciprocal acquisition sequences with V and Y strains and B and Y strains. D.W.L.

740—TÉLIZ, D., GROGAN, R. G. & LOWNSBERY, B. F., 1966. "Transmission of tomato ringspot, peach yellow bud mosaic, and grape yellow vein viruses by *Xiphinema americanum*." *Phytopathology*, 56 (6), 658–663.

Xiphinema americanum transmitted the type culture of tomato ring-spot virus (TomRSV), peach yellow bud mosaic virus (PYBMV) and grape yellow vein virus (GYVV). TomRSV and PYBMV were serologically and symptomatologically identical. GYVV was symptomatologically distinct and serologically related but distinct from the other 2 isolates. TomRSV, PYBMV and GYVV apparently are not related serologically to tobacco ring-spot virus. TomRSV was transmitted by a single nematode of *X. americanum*. 100% transmission of TomRSV was obtained with 100 hand-picked nematodes. Adults and 3 larval stages of the nematode transmitted TomRSV. *X. americanum* can acquire TomRSV from mechanically inoculated cucumber plants within an hour and can inoculate it into healthy cucumber plants in one hour. [A.S.] D.W.L.

3324—DALE, W. T. & HENDY, A. F., 1967. "Control of arabis mosaic virus in strawberry with nematicides." *Pl. Path.*, 16 (4), 187–191.

Soil inoculation with D-D (400 lb. per acre), Chloropicrin (34 Imp. gal. per acre) or metham sodium (110 Imp. gal. per acre) did not kill *Xiphinema diversicaudatum* sufficiently to control arabis mosaic virus in strawberries planted in Cheshire, England, on a previously heavily infested soil. After further clearing of the same site 18 months later, retreatment with D-D and chloropicrin the same month and replanting 2 months later, vector numbers remained very low for about 3 years, spread of virus was greatly reduced and plant vigour and yield increased. Chloropicrin increased growth, yield and quality more than did D-D; this was probably not due to superior vector or virus control but to more pronounced side effects such as increased ammonium-nitrogen and reduced nitrate-nitrogen). Dazomet granules at 200 lb. per acre had little effect. S.W.A.

3387—HOOF, H. A. VAN, 1967. "Aaltjes als virusoverbrengers bij planten." *Landbouwk. Tijdschr., Wageningen*, 79 (2), 38–43.

A survey of the viruses transmitted by 3 nematode genera was made in the Netherlands. Some populations of a particular species could transmit a certain virus strain while others could not. Tobacco rattle virus was transmitted by *Trichodorus phachydermus*, *T. primitivus*, *T. similis*, *T. teres* and *T. viruliferus*; less frequently also by *T. cylindricus* and *T. anemones* while *T. nanus* was most probably a very poor vector. *T. teres* also transmitted pea early browning virus. Among *Xiphinema* spp., only *X. diversicaudatum* was important in the Netherlands as a vector of Arabis mosaic virus and among *Longidorus* spp., *L. elongatus* was known to be a vector of raspberry ring spot virus and tomato black ring virus. [From *Rev. appl. Mycol.*, 47, 193.] S.W.A.

3388—HOOF, H. A. VAN, 1968. "Transmission of tobacco rattle virus by *Trichodorus* species." *Nematologica*, 14 (1), 20–24. [Germany summary p. 24.]

9 species of *Trichodorus* were found in the Netherlands, all potential vectors of tobacco rattle virus (TRV). *T. nanus* was the least efficient vector. Non-viruliferous populations of *Trichodorus* could only rarely be made viruliferous by giving them access to infector plants inoculated with TRV. It is concluded that TRV will not be readily spread by infected plant material since there is only a small chance that the TRV strain will suit the population of *Trichodorus* in the new habitat. M.M.H.

3395—MURANT, A. F., TAYLOR, C. E. & CHAMBERS, J., 1968. "Properties, relationships and transmission of a strain of raspberry ringspot virus infecting raspberry cultivars immune to the common Scottish strain." *Ann. appl. Biol.*, 61 (2), 175–186.

Plants of Lloyd George and Seedling M raspberry (*Rubus idaeus*) were found in eastern Scotland infected with raspberry ring spot (RRV), a virus to which these varieties were previously considered immune. Most RRV isolates from affected plants caused milder symptoms in herbaceous test plants than did the type isolates of the common Scottish and English strains. In graft-transmission tests the Lloyd George strain of RRV infected all the raspberry cultivars tested, including those immune to the common Scottish strain. No consistent differences were found between isolates of the 2 strains either in *in vitro* properties or in serological behaviour. Both strains were transmitted in seed of *Stellaria media* and in soil containing *Longidorus elongatus*. Possible reasons why the new strain is uncommon in Scotland are discussed. [A.S.] S.W.A.

3385—DALMASSO, A., 1967. "Connaissances actuelles sur les nématodes phytophages et leurs relations avec les maladies à virus." *Annls Épiphyt.*, 18 (2), 249–272. [English summary p. 266.]

Relationships between plant nematodes and soil-borne viruses, and methods of study and control are reviewed and discussed. J.E.P.

3386—DAS, S. & RASKI, D. J., 1968. "Vector-efficiency of *Xiphinema index* in the transmission of grapevine fanleaf virus." *Nematologica*, 14 (1), 55–62. [German summary p. 61.]

Xiphinema index acquired and transmitted grapevine fanleaf virus within access times of 15 min. The virus was retained for at least 12 weeks when the nematodes were maintained on fig but not in fallow soil. A soil temperature of 13 to 24°C. with an optimum of 19°C. was favourable for transmission of virus. Axenization by chemical treatment did not appear to decrease vector efficiency. M.M.H.

3111—SAVARY, A., 1968. "Les nématodes vecteurs du virus de la dégénérescence infectieuse dans les vignobles du Bassin lémanique." [Abstract.] *International Symposium of Nematology* (8th), Antibes, Sept. 8–14, 1965. Reports, p. 108.

2106—HARRISON, B. D., 1967. "The transmission of strawberry latent ringspot virus by *Xiphinema diversicaudatum* (Nematoda)." *Ann. appl. Biol.*, 60 (3), 405–409.

Strawberry latent ring spot virus (SLRV) was found in diseased rose-bushes growing in a glasshouse where the soil contained *Xiphinema diversicaudatum*. Adult female, adult male and juvenile *X. diversicaudatum* all transmitted the virus to cucumber seedlings, and nematodes, kept away from plants for 12 days after acquiring SLRV, later transmitted it. When transferred to fresh plants every 2 to 4 days for 3 weeks, single nematodes transmitted the virus on up to 3 successive occasions; one nematode did not transmit until 19 days after the transfers began. One adult *X. diversicaudatum* of 141 tested transmitted both SLRV and arabis mosaic virus. The behaviour of *X. diversicaudatum* as a vector, was the same for SLRV as it was for arabis mosaic virus. J.E.P.

2413—TAYLOR, C. E., 1968. "The association of ringspot viruses with their nematode vectors." [Abstract.] *International Symposium of Nematology* (8th), Antibes, Sept. 8–14, 1965. Reports, pp. 109–110.

2414—WEISCHER, B., 1968. "Wechselwirkungen zwischen Nematoden und anderen Schaderregern an Nutzplanzen." *International Symposium of Nematology* (8th), Antibes, Sept. 8–14. 1965. Reports, pp. 91–107. [English summary p. 103.]

Weischer reviews, with reference to the newest literature, the relationships between nematodes and other infections (fungi, bacteria and viruses) in plants, using as a basis the classification scheme and tables given by Pitcher (see *Helminth. Abstr.*, 34, pp. 1–17). He discusses (i) nematodes as precursors of other infections, (ii) nematodes as facultative or obligatory vectors, (iii) associations without a specific pathological effect and (iv) associations which increase or decrease the individual pathogenic effects. G.I.P.

1319—TÉLIZ ORTIZ, D., 1967. "Transmission of tomato ringspot, grape yellow vein, peach yellow bud mosaic, and tobacco ringspot viruses by the nematode *Xiphinema americanum* Cobb, 1913." *Diss. Abstr.*, 27 (9), 2958.

560—FULTON, J. P., 1967. "Dual transmission of tobacco ringspot virus and tomato ringspot virus by *Xiphinema americanum*." *Phytopathology*, 57 (6), 535–537.

Both tobacco ring spot virus and tomato ring spot virus were transmitted by *Xiphinema americanum*. Single nematodes acquired both viruses from a doubly infected host or from 2 separate hosts. Following acquisition of both viruses, single nematodes transmitted one or the other or both viruses. [A.S.] J.E.P.

562—MOORE, J. F., 1967. "Results of preliminary survey for virus vector nematodes in Ireland." *Scient. Proc. R. Dubl. Soc.*, Ser. B, 2 (10), 81–86.

Results from soil samples examined during a preliminary survey for *Xiphinema* and *Longidorus* from 10 counties are presented. The occurrence of *Longidorus* in some of these samples is a new record for the Republic of Ireland. The occurrence of *Trichodorus* in 2 areas is also reported. Detailed sampling of *X. diversicaudatum* in a strawberry field revealed the presence of the nematode in large numbers at the base of hedgerows, indicating that this species was not introduced with the soft-fruit planting material [A.S.] D.W.L.

564—SCHMELZER, K., 1963. "Prämunitätsverhältnisse bei Nematodenübertragbaren Ringfleckenviren." *Biol. Zbl.*, 82 (5), 601–611.

The primary relationships between nematode-transmitted ring spot viruses were studied. There appeared to be no protective effects among the different isolates. J.E.P.

565—SCOTTO LA MASSESE, C. & BLACHE, M., 1966. "Un dépérissement des pêchers." *Phytoma*, 18 (179), 21–23.

Nematodes known to transmit other viruses are associated with peach trees but cannot with certainty be implicated as vectors of "court-noué" in Ardèche, France. D.W.L.

566—TELIZ, D., 1967. "Effects of nematode extraction method, soil mixture, and nematode numbers on the transmission of tobacco ringspot virus by *Xiphinema americanum*." *Nematologica*, 13 (2), 177–185. [German & Spanish summaries p. 184.]

The effect of passing *Xiphinema americanum* through a Baermann funnel diminished its activity and its capacity to transmit tobacco ring spot virus. The mistifier extraction technique had no such effect. Single nematodes occasionally transmitted the virus but consistently successful transmission was achieved by using the vector nematodes in batches of 100. Transmission was favoured in these experiments by using a soil medium composed of sand, peat moss and commercial fertilizer. J.E.P.

558—CREMER, M. C. & SCHENK, P. K., 1967. "Notched leaf in *Gladiolus* spp., caused by viruses of the tobacco rattle virus group." *Neth. J. Pl. Path.*, 73 (2), 33–48. [Dutch summary pp. 46–47.]

Notched leaf disease in gladiolus is caused by tobacco rattle virus and transmitted by *Trichodorus pachydermus* and *T. similis*. Symptoms of the disease were produced experimentally in the first season only when the nematode vectors were able to infect the young sprouts on top of the corms. When plants were infected through the roots, symptoms appeared in the offspring of the following season. At least 2 serologically different strains of the virus were isolated from diseased gladiolus but they were not geographically distinct. Gladiolus with notched leaf disease grew in fields where potatoes had stem mottle or "spraing" disease. The authors note that in their experience *Trichodorus* is easily killed by disturbing or mixing the soil and that crop rotation is a key factor in determining the rate of infection by the virus. J.E.P.

6377—BOUBALS, D. & DALMASSO, A., 1968. "Résultats d'essais de désinfection de sols à vigne du sud de la France." *Progrès agric. vitic.*, 168 (2/3), 29–37. 74–81.

D-D controlled grapevine fan leaf virus disease and cleared roots and soil of *Xiphinema index* in shallow soil vineyards in southern France. Treatment over 6 years resulted in a 4-fold increase of yield compared with the control plot. In these shallow soils, reinfestation by nematodes follows a particular pattern: firstly mycophagous species, then tylenchids, then *Paratylenchus* (in large numbers) and finally *X. americanum* and *X. index*. *X. index* is always present when grapevine fan leaf virus disease has remained after treatment. Similar trials are in progress against this disease in deep soils in the Bas-Langnedoc region. The effect of the treatment lasts only to the harvesting of the first crop. L.E-L.

6229—SZCZYGIEŁ, A., 1966. "Rola nicieni w przenoszeniu wirusów roślinnych." *Postępy Nauk roln.*, No. 5, pp. 113–122.

The literature on plant viruses transmitted by nematodes is reviewed. The virus-nematode interrelationship and the survival of viruses under natural conditions are discussed. A detailed review of the methods used in the control of viruses transmitted by nematodes is given. J.H.B.

6230—THOMAS, P. R., 1969. "Crop and weed plants compared as hosts of viruliferous *Longidorus elongatus* (de Man)." *Pl. Path.*, 18 (1), 23–28.

Strawberry, grasses and clover were the best hosts for *Longidorus elongatus* tested but most crops tested were poor or non hosts. All weeds except *Agropyron repens* supported more nematodes than the fallow controls. Raspberry ring spot and tomato black ring viruses were found in most of the plant species but the frequency of infection was not always related to the suitability of the host for the nematode vector. J.B.

6211—HARRISON, B. D., 1968. "Reactions of some old and new British potato cultivars to tobacco rattle virus." *Eur. Potato J.*, 11 (3), 165–176. [French & German summaries pp. 174–175.]

The susceptibility of 14 potato cultivars in Norfolk, England, to tobacco rattle virus was estimated. The virus is transmitted by *Trichodorus pachydermus*. J.B.

*6214—KRALL, E., 1965. "Fitogelminty kak inokulyatory virusnykh boleznei rastenii i ikh rasprostranenie v SSSR." [Plant nematodes as carriers of virus diseases and their distribution in the USSR.] *Eesti NSV Tead. Akad. Toim., Ser. Biol.*, 14 (1), 28–35. [Estonian & German summaries.]

Xiphinema, *Longidorus* and *Trichodorus* are widespread in different parts of the USSR. *L. elongatus* and *T. pachydermus* occur in large numbers in Estonia. The increasing incidence of virus diseases and the frequent occurrence of the above nematodes are probably related. [From *Rev. appl. Mycol.*, 44, No. 3009.]

6209—FULTON, J. P., 1969. "Transmission of tobacco ringspot virus to the roots of a conifer by a nematode." *Phytopathology*, 59 (2), 236.

Xiphinema americanum was found to transmit tobacco ring spot virus to Arizona cypress but not to *Pinus sylvestris* or *P. echinata* in pot tests in the U.S.A. J.B.

6205—BIRD, A. F., 1969. "The influence of tobacco ring spot virus and tobacco mosaic virus on the growth of *Meloidogyne javanica*." *Nematologica*, 15 (2), 201–209. [German summary p. 208.]

Tobacco ring spot virus (TRSV) and tobacco mosaic virus (TMV) can influence the host-parasite relationship of *Meloidogyne javanica*. More nematodes enter TRSV infected beans than healthy beans although in both cases the growth rate of the nematodes is the same. There was no evidence of a synergistic effect between *M. javanica* and TRSV on root growth in beans. Nematodes grow more rapidly in TMV infected tomatoes than in uninfected controls although the presence of the virus does not appear to influence the number of nematodes entering the plant. J.B.

4137—SMITH, K. M., 1968. "Plant viruses." *London: Methuen & Co. Ltd. (New York: Barnes & Noble, Inc.)*, 4th edit., ix + 166 pp.

Included in this book is an account of the discovery and importance of virus transmitting nematodes. The length of time a nematode can carry an infective virus is given and the evidence for a biological relationship between a nematode and a virus is discussed. J.B.

4139—BRITAIN, 1968. "Report of the Agricultural Research Council, 1967–68." *London: H.M. Stationery Office*, viii + 112 pp. [Plant nematodes pp. 9, 53.]

The Plant Breeding Institute, Cambridge, England, has developed an early-flowering red clover which is resistant to clover rot and to *Ditylenchus dipsaci*. The Zoology Section of the Scottish Horticultural Research Institute is mainly concerned with the biology and control of *Longidorus* spp., *Trichodorus* spp. and *Xiphinema* spp., vectors of plant viruses, and the means by which the viruses are transmitted. Quintozene (pentachloronitrobenzene) has proved an efficient nematicide. B.G.

3983—SCOGNAMIGLIO, A. & TARJAN, A. C., 1967. "Trasmissione di virus da parte di nematodi fitoparassiti con indagini sulla diffusione dei nematodi vettori nei vigneti dell'Abruzzo, Molise e Marche." *Riv. Vitic. Enol.*, 20 (8), 351–360; (9), 371–392. [English summary p. 386.]

The known virus vectors in the genera *Trichodorus*, *Longidorus* and *Xiphinema* are described and keys to species given. The distribution of *Xiphinema* and *Longidorus* species in vineyards and fig plantings in the Abruzzo, Molise and Marche regions of Italy is reported. Control by chemicals, cultural practices and resistant varieties is discussed. J.B.

3986—TEMIZ, K., AKAR, K. & YÜREKTÜRK, M., 1968. "Yalova çevresinde önemli zararlari görülen sogan sari cüce virüsü ve sogan nematodu üzerine incelemeler." *Yalova-Bahçe, Kült. Araşt. Egit. merkezi. Derg.*, 1 (2), 76–82. [English summary p. 81.]

Onion yellow dwarf virus and an onion nematode, causing serious damage in the Yalova district of Turkey were studied. [From *Rev. appl. Mycol.*, 47 No. 3647.]

3973—BJØRNSTAD, A. & STØEN, M., 1967. "Rattelvirus med *Trichodorus pachydermus* som vektor." *Norsk Landbr.*, No. 8, pp. 12–14.

Trichodorus pachydermus was shown to transmit rattle virus. *Nicotiana tabacum* was used as a test plant. *Longidorus* spp. extracted from the same soil samples did not transmit the virus. The soil samples were originally taken from a field where potato plants and tubers exhibited rattle virus symptoms. Investigations in progress indicate other *Trichodorus* species as possible vectors of rattle virus in Norway. K.B.E.

3975—GONZÁLEZ, R., H. & VALENZUELA, B., J., 1968. "*Xiphinema index* (Thorne et Allen y *Xiphinema americanum* (Cobb) en viñedos chilenos." *Agricultura téc.*, 28 (2), 89.

Virus diseases transmitted by *Xiphinema* spp. are reviewed. *X. index* is recorded as transmitting fanleaf and yellow mosaic viruses in vines in the Provinces of Santiago and Coquimbo, Chile. *X. americanum*, associated with yellow vein virus, was found in wild and cultivated vines in Atacama Province. Methods of eradication of these virus vectors are mentioned. P.S.G.

3979—MACFARLANE, I., JENKINS, J. E. E. & MELVILLE, S. C., 1968. "A soil-borne virus of winter oats." *Pl. Path.*, 17 (4), 167–170.

Studies of diseased oats in Devon, England, suggested the presence of oat-mosaic virus, previously unrecorded in Britain. The virus is soil borne and the possibility of it being transmitted by fungi or nematodes is discussed. J.B.

2808—STURHAN, D., 1966. "Vorkommen virusübertragender Nematoden in Bayern." *Gesunde Pfl.*, 18 (5), 93–96.

9 species of nematodes in the genera *Xiphinema Longidorus* and *Trichodorus* have been recorded in Bavaria, 4 of them being known as vectors of plant viruses. [From *Rev. appl. Mycol.*, 45, No. 2767.] J.B.

2809—TÉLIZ, D., LOWNSBERY, B. F., GROGAN, R. G. & KIMBLE, K. A., 1967. "Transmission of peach yellow bud mosaic virus to peach, apricot, and plum by *Xiphinema americanum*." *Pl. Dis. Reptr*, 51 (10), 841–843.

Xiphinema americanum was shown to transmit peach yellow bud mosaic virus from cucumber plants to cucumber roots, peach variety Lovell, apricot variety Royal and plum variety Damson. Movement of the virus from roots to shoots was not demonstrated in apricot and plum. The possibility of using this fact as a control method is discussed. J.B.

*2802—FRITZSCHE, R. & KEGLER, H., 1964. "Die Übertragung des Blattrollvirus der Kirsche (cherry leaf-roll virus) durch Nematoden." *Naturwissenschaften*, 51 (12), 299.

*2803—HARRISON, B. D., 1964. "Infection of gymnosperms with nematode-transmitted viruses of flowering plants." *Virology*, 24, 228–229.

1148—TAYLOR, C. E. & THOMAS, P. R., 1968. "The association of *Xiphinema diversicaudatum* (Micoletsky) with strawberry latent ringspot and arabis mosaic viruses in a raspberry plantation." *Ann. appl. Biol.*, 62 (1), 147–157.

An outbreak of strawberry latent ringspot virus (SLRV) in a plantation of Malling Jewel raspberry in Scotland coincided with the greatest abundance of the nematode vector, *Xiphinema diversicaudatum*. Arabis mosaic virus (AMV) was not detected in the crop but was present, together with SLRV, in many weed species. AMV was transmitted through the seed of *Poa annua*, *Capsella bursapastoris* and *Senecio vulgaris* and SLRV through the seed of *Mentha arvensis*. *X. diversicaudatum* was more numerous within the rows than between them and vertical sampling showed that most occurred at a depth of between 4 and 12 in. in both locations. Monthly sampling showed that egg laying occurred from April to July; populations increased to a peak in late autumn but declined during the winter, resulting in about a twofold annual increase in numbers. Females, males and juveniles transmitted AMV and SLRV to cucumber seedlings and in the absence of plants the nematode retained AMV for 112 days and SLRV for 84 days. [A.S.] S.W.A.

1149—YASSIN, A. M., 1968. "Transmission of viruses by *Longidorus elongatus*." *Nematologica*, 14 (3), 419–428. [German summary p. 427.]

Adult females of *Longidorus elongatus* transmitted tomato black ring virus (TBRV) less often than larvae. Only isolates from eastern Scotland, serologically indistinguishable from each other, were transmitted by local *L. elongatus*, while isolates from Germany and England, serologically distinct from the Scottish isolates, were not transmitted. However, these foreign isolates, although not transmitted, were recovered directly from the nematodes. The same was also found with isolates of raspberry ringspot virus (RRV). The nature of predominance of RRV in simultaneous field outbreaks of TBRV and RRV was investigated in glasshouse tests. The viruses and *L. elongatus* came from the same source. Single larvae of *L. elongatus* acquired both viruses but the role of such viruses in transmission was unknown. RRV became dominant over TBRV when petunia plants were inoculated with both viruses simultaneously. It seemed likely that interference between the 2 viruses in plants may explain the predominance of RRV in field outbreaks. P.S.G.

1142—KATCHO, Z. A. & ALLOW, J. M., 1968. "Dagger nematodes, *Xiphinema index*, on grapevines in Iraq." *Pl. Dis. Reptr*, 52 (8), 626–627.

Xiphinema index has been found associated with *Vitis* sp. suffering from fan-leaf disease and may be the vector of the fan-leaf virus. This is the first known report of *X. index* associated with diseased *Vitis* sp. in Iraq. J.B.

1138—FLORES, H. & CHAPMAN, R. A., 1968. "Population development of *Xiphinema americanum* in relation to its role as a vector of tobacco ringspot virus." *Phytopathology*, 58 (6), 814–817.

A study of populations of *Xiphinema americanum* associated with tobacco and an associated sod rotation crop showed that larvae predominated in the spring and adults in the autumn; numbers were lower in the summer. Higher numbers developed under the sod than under the tobacco crop. In the laboratory rose and grape were good hosts. *X. americanum* transmitted tobacco ringspot virus (TRSV) to tobacco from cucumber and tobacco in the laboratory. The lapse of time (31 to 48 days) between inoculation and appearance of TRSV symptoms in tobacco coincides with the time between transplanting and symptom development in the field. At this time the population is at its smallest and this explains the difficulty of correlating the appearance of TRSV symptoms in the plants with the occurrence of nematodes in the soil. P.S.G.

1115—RICHTER, E., 1968. "Untersuchungen über den Einfluss der Fruchtfolge auf die Populationsdichte freilebender Nematoden im Zusammenhang mit der Kringeligkeid-Pfropfenbildung der Kartoffel. I. Populationsdichte der Nematoden." *Z. PflKrankh. PflPath. PflSchutz*, 75 (1), 9–23. [English summary p. 22.]

The incidence of corky ringspot on potatoes and the influence of different crops and crop rotations on the numbers of *Trichodorus* were investigated. A comparison of the quantitative changes of *Trichodorus*, *Pratylenchus* and *Tylenchorhynchus* between 1964 and 1965 showed that the extreme dry weather conditions in 1964 were a limiting factor. Crop rotation had only a slight over-all effect on the numbers of *Trichodorus* and *Tylenchorhynchus* but had a pronounced effect on the numbers of *Pratylenchus*. [From English summary.] S.W.A.

63—NYLAND, G., LOWNSBERY, B. F., LOWE, S. K. & MITCHELL, J. F., 1969. "The transmission of cherry rasp leaf virus by *Xiphinema americanum*." *Phytopathology*, 59 (8), 1111–1112.

Xiphinema americanum was shown to transmit cherry rasp leaf virus to *Chenopodium amaranticolor* and *C. quinoa*. J.B.

71—TAYLOR, C. E. & CADMAN, C. H., 1969. "Nematode vectors." In: Maramorosch, K. [Editor], "Viruses, vectors and vegetation." *London: John Wiley & Sons Ltd.*, pp. 55–94.

This is a comprehensive review of the current knowledge of nematode/virus associations and deals with the relevant biology of the nematodes and the viruses, their host range, ecology and control. There is a 9-page bibliography. J.B.

72—TAYLOR, C. E. & MURANT, A. F., 1969. "Transmission of strains of raspberry ringspot and tomato black ring viruses by *Longidorus elongatus* (de Man)." *Ann. appl. Biol.*, 64 (1), 43–48.

†381—PERSSON, S., 1968. "Nematoder av släktet *Trichodorus* i sydsvenska åkerjordar och deras förmåga att överföra rattlevirus." *Meddn St. VäxtskAnst.*, 14 (123), 167–199. [English summary pp. 195–196.]

A survey done in southern Sweden during the years 1964 to 1966 revealed that *Trichodorus* spp. are fairly common, especially in light soils. *T. pachydermus* had the widest distribution, followed by *T. primitivus* and *T. similis*. There was a close connection between the occurrence of *Trichodorus* spp. and the presence of rattle virus symptoms in potatoes. With tobacco variety White Burley used as an indicator plant it was demonstrated that rattle virus was transmitted by males and females of *T. pachydermus* and by males of *T. primitivus*. *T. similis* did not transmit virus. *T. pachydermus* was still able to transmit virus after 9 months storage in a refrigerator. K.B.E.

*383—SÁROSPATAKI, G., MARTELLI, G. & LEHOCZKY, J., 1968. "A Szölö parazita fonalférgeinek elöfordulása Magyarországi szölövidékek talajában, különös tekintettel virusvektor fajokra." *Szölész. Kut. Intéz. Évk.*, 13, 135–150. [English & Russian summaries.]

The presence of parasitic nematodes of grapevine in the soil of Hungarian vine-growing districts is recorded with special reference to vectors of viruses. [From *Rev. appl. Mycol.*, 48, No. 3083.]

*672—MARTELLI, G. & SÁROSPATAKI, G., 1969. "Nematodes of the family Longidoridae (Thorne, 1935) Meyl, 1960 found in Hungarian vineyards and virus transmission trials with *Xiphinema index* Thorne et Allen." *Phytopath. Mediterranea*, 8 (1), 1–7. [French & Italian summaries.]

In transmission trials, *Xiphinema index* acted as a vector of grapevine yellow mosaic virus. The 2 soil borne grapevine diseases in Hungary, yellow mosaic and chrome mosaic (with virtually indistinguishable symptoms), are probably caused by different viruses and transmitted by different vectors. [From *Rev. appl. Mycol.*, 48, No. 3084.]

*678—POSNETTE, A. F., 1969. "Nematode-transmitted viruses in asparagus." *J. hort. Sci.*, 44 (4), 403–406.

Arabis mosaic, strawberry latent ringspot and tomato black ring viruses were isolated from asparagus growing on a site where strawberry plants had previously become infected with the first 2 viruses. Infected asparagus plants were less vigorous than healthy ones but as the viruses were not found in about half the stunted plants, an unidentified virus may also infect them. The population of *Xiphinema diversicaudatum*, vector of arabis mosaic virus, declined under, but was not eliminated by, asparagus culture. [From *Rev. Pl. Path.*, 49, No. 633.]

1023—THOMAS, P. R., 1970. "Host status of some plants for *Xiphinema diversicaudatum* (Micol.) and their susceptibility to viruses transmitted by this species." *Ann. appl. Biol.*, 65 (1), 169–178.

Forty plant species were grown in pots containing viruliferous *Xiphinema diversicaudatum* for 15 weeks to assess the host range of the nematode in relation to infection with arabis mosaic (AMV) and strawberry latent ringspot (SLRV) viruses. Host status for the nematode was determined mainly from changes in total populations, but the presence of eggs in the uteri of females and changes in the

1020—RUSH, M. C., 1970. "Transmission of serological strains of tobacco ringspot virus by *Xiphinema americanum*." [Abstract.] *Phytopathology*, 60 (4), 587.

1021—RUSH, M. C., 1970. "Transmission of tobacco ringspot virus from native hosts to *Cucumis sativus* by *Xiphinema americanum*." *Phytopathology*, 60 (5), 917–918.

Tobacco ringspot virus was transmitted to cucumber seedlings from naturally infected or inoculated *Eupatorium capilifolium*, *Plantago lanceolata*, *Rumex obtusifolius* and *Xanthium strumarium* plants by hand-picked *Xiphinema americanum*. [A.S.] J.E.P.

1014—COHN, E., TANNE, E. & NITZANY, F. E., 1970. "*Xiphinema italiae*, a new vector of grapevine fanleaf virus." *Phytopathology*, 60 (1), 181–182.

From Israel, *Xiphinema italiae* is recorded as a new vector of grapevine fanleaf virus which up to now has only been known to have been transmitted by *X. index*. J.E.P.

16—FRITZSCHE, R., 1968. "Beitrag zum Wanderungsverhalten von *Xiphinema diversicaudatum* (Mikoletzky) Thorne, *X. coxi* Tarjan und *Longidorus macrosoma* Hooper sowie der Ausbreitung des Rhabarbermosaik-Virus im Feldbestand." *Biol. Zbl.*, 87, 481–488. [English summary p. 487.]

Xiphinema coxi is associated with the spread of rhubarb mosaic virus in Germany. The optimum temperature and moisture conditions for migrating *X. coxi*, *X. diversicaudatum* and *Longidorus macrosoma* are 20 to 22°C. and 18 to 20%. Soil type influences the speed of migration which is 1·4 mm. per day in humose loam and about 2 mm. per day in light sands. [A.S.] B.G.

73—MARÉNAUD, C. & DUNEZ, J., 1969, "Contribution à l'étude des virus transmis par nématodes chez les arbres fruitiers à noyau." *Annls Phytopath.*, 1 (4), 591–602. [English summary pp. 601–602.]

The properties of nematode-transmitted viruses of fruit trees are discussed. P.S.G.

78—RUSH, M. C., 1970. "Serological strains of tobacco ringspot virus transmitted by *Xiphinema americanum*." *J. Nematol.*, 2 (3), 265–269.

Five serological strains of tobacco ringspot virus isolated from naturally-infected tobacco in North Carolina, USA, and a strain isolated from watermelon in the Rio Grande Valley of Texas, were transmitted from cucumber to cucumber by mass-screened and handpicked *Xiphinema americanum* from North Carolina. The Eucharis mottle strain from Peru was not transmitted, indicating that a specific strain-vector relationship may exist between the geographically-isolated strains from North and South America. [A.S.] C.E.S.

79—TAYLOR, C. E., 1970. "The association of *Longidorus elongatus* with raspberry ringspot and tomato black ring viruses." *Zesz. probl. Postęp. Nauk roln.*, No. 92 (Proc. Int. Nematol. Symp. (9th), Warsaw, August 21–24, 1967), pp. 283–289. [Russian summary p. 288. Discussion pp. 288–289.]

Economically important diseases of strawberry and raspberry crops in Scotland are caused by raspberry ringspot and tomato black ring viruses transmitted by *Longidorus elongatus*. The characteristics of the diseases as related to the behaviour of the nematode are described. The virus is retained by the nematode for only a few weeks and does not pass through the egg stage or the moult. *L. elongatus* and both viruses have wide but differing host ranges among cultivated plants and weeds. In laboratory experiments it was found that *L. elongatus* transmitted the Scottish strain of tomato black ring virus but not English or German strains. 2 English and 2 Scottish isolates of raspberry ringspot which were serologically distinct were transmitted. C.E.S.

69—FRITZSCHE, R., 1970. "Beiträge zum Übertragungsmechanismus pflanzen-pathogener Viren durch Nematoden." *Zesz. probl. Postęp. Nauk roln.*, No. 92 (Proc. Int. Nematol. Symp. (9th), Warsaw, August 21–24, 1967), pp. 293–300. [Russian summary pp. 299–300.]

The transmission of the brome-grass mosaic virus by *Xiphinema diversicaudatum* and *Longidorus macrosoma* is reviewed. The transmission rate was up to 16% with the former species and up to 78% with the latter. With both species the ability to transmit, after removal from the virus source, is retained for less than the life-span of the virus *in vitro*. Both larval and adult worms are capable of transmission. Experimental evidence does not indicate a close biological association between the virus and the vector. M.R.N.S.

70—GLASER, T. & SKOWROŃSKI, Z., 1970. "Krzaczastość winorośli." [A virus disease of grapevine.] *Ochr. Roślin*, **14** (2), 13–15.

Xiphinema index is reported as a transmitter of virus to grape in Poland. P.S.G.

71—HARRISON, B. D., 1969. "On the transmission of tomato black ring virus by *Longidorus attenuatus* (Nematoda)." *Zentbl. Bakt. ParasitKde*, Abt. 2, **123** (3), 226–229. [German summary p. 228.]

The English form of tomato black ring virus was serially transmitted to cucumber seedlings by *Longidorus attenuatus*. One of 4 adult females and 2 of 6 juveniles transmitted the virus. The adult transmitted only once, but one juvenile transmitted twice with an interval of at least 10 days between transmissions, and the other transmitted 5 times over a period of more than 2 weeks. *L. attenuatus* transmitted slightly less often at 29°C. than at 20 or 24°C. K.J.O.W.

330—COOPER, J. I. & THOMAS, P. R., 1970. "*Trichodorus nanus*, a vector of tobacco rattle virus in Scotland." *Pl. Path.*, **19** (4), 197.

Trichodorus nanus was found during May 1969 in soil from fields at 2 localities in eastern Scotland. Leaves of several plants of a species of *Hieracium* at Gullane showed yellow ring-like symptoms characteristic of tobacco rattle virus (TRV). *T. nanus*, extracted from Gullane soil, was added to cucumber seedlings in pots. The presence of TRV was confirmed when lesions developed on the leaves of *Chenopodium amaranticolor* which had been inoculated with the cucumber root sap. This is the first report both of the occurrence of *T. nanus* and of TRV transmission by this nematode, in Britain. K.J.O.W.

332—HOOF, H. A. VAN, 1971. "Viruses transmitted by *Xiphinema* species in the Netherlands." *Neth. J. Pl. Path.*, **77** (1), 30–31. [Dutch summary pp. 30–31.]

In a short communication the author records that strawberry latent ringspot virus (hitherto unreported in the Netherlands) was transmitted by *Xiphinema diversicaudatum* but not by *X. coxi*. Tobacco ringspot virus was not transmitted by *X. diversicaudatum* but was by 2 Dutch populations of *X. coxi*. The results of these and earlier transmission experiments [see also *Helminth. Abstr.*, **36**, No. 2418] are summarized in a table. K.J.O.W.

*336—PUTZ, C. & STOCKY, G., 1970. "Premières observations sur une souche de strawberry latent ringspot virus transmise par *Xiphinema coxi* Tarjan et associée à une maladie du framboisier en Alsace." *Annls Phytopath.*, **2** (2), 329–347. [English & German summaries.]

Strawberry latent ringspot virus was isolated from severely dwarfed raspberries. The symptoms on test plants (mainly *Chenopodium* spp. and *Tetragonia expansa*) and some properties of the virus are described. Transmission tests showed *Xiphinema coxi* to be the vector. [From *Rev. Pl. Path.*, 50, No. 800.] P.S.G.

784—STEUDEL, W., 1969. "Untersuchungen zur Wirkung einiger Nematizide auf *Trichodorus* spp." *Mitt. biol. BundAnst. Ld- u. Forstw.*, No. 136, pp. 77–86. [English summary p. 85.]

In field experiments in 1968 with various nematicides, the non-phytotoxic compounds, aldicarb and metaphenamiphos (the provisional name for an experimental preparation), effectively reduced the number of *Trichodorus* (mainly *T. pachydermus*) in the upper 20 cm. of soil. The effect was less in the deeper layers. In 1967 100% of the potato tubers in the experimental field showed brown spotting apparently associated with tobacco rattle virus, whereas in 1968 40% of tubers from untreated plots developed the symptoms. By applying nematicides, the incidence of diseased tubers could be reduced to about 5%. Differences between treated and untreated plots were highly significant and were still present at the end of December. It is suggested that the reduction by nematicides in the numbers of *Trichodorus* as vectors of tobacco rattle virus is responsible for these results. [From English summary.] M.T.F.

704—FRITZSCHE, R., 1968. "Ökologie und Vektorcignung von *Longidorus macrosoma* Hooper." *Biol. Zbl.*, **87** (2), 139–146. [English summary p. 145.]

The ecology and distribution of *Longidorus macrosoma* in East Germany, are described. Sites shaded by trees and bushes, with a high soil water content, are preferred. The plants comprising the vegetation in a typical habitat are listed. Population studies over 3 years showed that maximum numbers of nematodes were found between April and July. Nematode density in the soil was greatest at depths between 10 and 30 cm. *L. macrosoma* was able to transmit raspberry ringspot virus (2 isolates), necrotic ringspot virus of cherry, carnation ringspot virus and brome grass mosaic virus. No transmission occurred with arabis mosaic virus, "Hopfenkräuselmosaik-Virus", tomato black ring virus and chlorotic-necrotic ringspot virus of cherry. M.R.N.S.

*584—FRITZSCHE, R., 1970. "Wechselbeziehungen zwischen Virus- und Nematodenbefall in ihrem Einfluss auf den Schädigungsgrad der Pflanzen." *Biol. Zbl.*, 89 (2), 225–232. [English summary.]

Joint attacks of arabis mosaic or cucumber mosaic viruses and nematodes inhibited the growth of test plants (*Petunia* sp., cucumber) more than virus or nematode infection alone. The time of appearance of virus symptoms was not affected by nematodes, but symptoms were intensified. Nematode incidence was lower on virus-infected plants. [From *Rev. Pl. Path.*, 50, No. 1135.] P.S.G.

586—HIBBEN, C. R. & WALKER, J. T., 1971. "Nematode transmission of ash ringspot virus." [Abstract.] *Phytopathology*, **61** (2), 129.

Ash ring spot virus was shown to be transmitted by *Xiphinema americanum*. M.T.F.

587—HOOF, H. A. VAN, 1970. "Some observations on retention of tobacco rattle virus in nematodes." *Neth. J. Pl. Path.*, **76** (6), 329–330. [Dutch summary p. 330.]

In a short communication the author records that tobacco plants were infected with tobacco rattle virus by a population of *Trichodorus* sp. that had been denied access to plant roots for 3 years. K.J.O.W.

593—MURANT, A. F., 1970. "The importance of wild plants in the ecology of nematode-transmitted plant viruses." *Outl. Agric.*, **6** (3), 114–121.

The author reviews recent information illustrating the importance of weeds in relation to nematode-transmitted plant viruses. Tables give the crop and weed host plants of viruses, seed transmission, persistence of viruses in their nematode vectors in fallow soil and when weeds are allowed to grow. There are 39 references. K.J.O.W.

1017—TAYLOR, C. E. & GORDON, S. C., 1970. "A comparison of four nematicides for the control of *Longidorus elongatus* and *Xiphinema diversicaudatum* and the viruses they transmit." *Hort. Res., Edinb.*, **10** (2), 133–141.

In laboratory experiments, D–D, dazomet and quintozene gave good control of *Longidorus elongatus* and *Xiphinema diversicaudatum*, and largely prevented virus transmission by them. Treatments were equally successful at 7, 14·5 and 22°C. Methomyl, at the normal rates, was only slightly nematicidal but completely prevented the transmission of virus. In a field experiment, methomyl prevented virus transmission in a rye-grass crop for only a few months and *L. elongatus* populations in the treated plots were as high as those in untreated ones; D–D and quintozene were the most effective treatments. In laboratory experiments, low concentrations of methomyl were shown to cause a continuous nervous excitation of muscular contraction in the nematodes, but high concentrations were immediately toxic. [A.S.] M.T.F.

*871—FRITZSCHE, R. & KEGLER, H., 1968. "Nematoden als Vektoren von Viruskrankheiten der Obstgewächse." *TagBer. dt. Akad. Landw-Wiss. Berl.*, No. 97, pp. 289–295. [English & Russian summaries.]

In experiments, *Longidorus macrosoma* transmitted raspberry ringspot virus and cherry necrotic ringspot virus. An isolate of raspberry ringspot virus from sweet cherries could be transmitted by both *L. macrosoma* and *Xiphinema diversicaudatum*. An unidentified virus in raspberries was transmitted by *X. brevicolle* and apple chlorotic leaf spot virus was transmitted by *Eudorylaimus* spp. [From *Hort. Abstr.*, 40, No. 5338.] M.T.F.

872—HIBBEN, C. R. & WALKER, J. T., 1971. "Nematode transmission of the ash strain of tobacco ringspot virus." *Pl. Dis. Reptr*, **55** (6), 475–478.

An ash strain of tobacco ringspot virus (ASTRSV) in ash (*Fraxinus americana*) is shown to be transmitted by a soil-borne vector. In experiments, *Xiphinema americanum* transmitted ASTRSV but was an inefficient vector, possibly due to low survival rate. M.T.F.

926—AYALA, A., ALLEN, M. W. & NOFFSINGER, E. M., 1970. "Host range, biology, and factors affecting survival and reproduction of the stubby root nematode." *J. Agric. Univ. P. Rico*, **54** (2), 341–369. [Spanish summary pp. 366–367.]

The biology and host range of *Trichodorus christiei*, *T. porosus* and *T. allius* were investigated in the laboratory. 2 isolates of *T. christiei* reproduced at all temperatures tested between 12 and 39°C., but best between 16 and 24°C.: for *T. porosus* the optimum was 24°C. *T. allius* reproduced well on sweet-pea between 21 and 24°C. and on cotton the optimum was 26°C. Soil type affected the rate of reproduction of *T. allius*, the most favourable media containing glasshouse potting soil in addition to coarse sand and white pearl sand. Daily addition of Hoagland's nutrient solution at concentrations up to 50% to cultures of *T. christiei* on sweet corn resulted in greater populations but 100% solution hindered multiplication. With *T. allius* on sweetpea, addition of the solution had no marked effect. Multiplication of *T. allius* on tobacco plants infected with California tobacco rattle virus was 9 times greater than on uninfected plants but the reason is not known. The results of host-range studies with the 3 *Trichodorus* species on a wide variety of plants are given in tables as the mean nematode numbers found after 8 weeks. *T. christiei* and *T. porosus* had different host preferences. The best host for *T. christiei* was *Lycopersicon peruvianum*, rated "excellent" but rated only "good" for *T. porosus* for which the best host was lucerne. *T. allius* had a wide host range, the best being *Helianthus annuus* and *Sorghum vulgare* var. *sudanense*, with *L. peruvianum* one of the poorest. Observations on egg-laying and survival *in vitro* of *T. christiei* and *T. allius* and a method of keeping the latter alive in water are given. M.T.F.

876—McGUIRE, J. M. & GOODE, M. J., 1970. "Effect of benomyl on *Xiphinema americanum* and tobacco ringspot virus infection." *Phytopathology*, 60 (7), 1150–1151.

When *Xiphinema americanum* were allowed to feed on cucumber plants (with or without tobacco ringspot virus infection), previously treated with the systemic fungicide benomyl, less than 30% were recovered alive after 30 days and many appeared to be moribund, as compared with 50% recovery of healthy individuals from non-treated plants. Fewer nematodes transmitted TRSV from treated than from non-treated plants and no transmission was obtained from treated to treated plants. In preliminary experiments seed treatment with benomyl had no apparent effect on the development of root-knot by *Meloidogyne incognita* on cucumber plants. M.T.F.

877—McGUIRE, J. M., KIM, K. S. & DOUTHIT, L. B., 1970. "Tobacco ringspot virus in the nematode *Xiphinema americanum*." *Virology*, 42 (1), 212–216.

2 specimens of *Xiphinema americanum* that had transmitted tobacco ringspot virus (TRSV) were sectioned and examined by electron microscopy. Virus-like particles resembling those of TRSV were found in the oesophageal lumen, particularly near the junction with the stylet extension, and in the tri-radiate lumen of the oesophageal bulb. Particles were concentrated near the lining of the lumen, probably held by the mucus-like material present there. A few particles were seen in the lumen of the stylet extension: none was found in nematodes that did not transmit TRSV. M.T.F.

867—CADMAN, C. H., 1970. "Modern developments in plant virus research with particular reference to potatoes." *Triennial Conf. (4th) Eur. Ass. Potato Res., Brest,* 8–13th Sept. 1969. Proceedings, pp. 51–64.

In this review, reference is made to the highly specific nature of the virus/nematode vector relationship and to the manner in which virus particles are carried and transmitted by nematodes. M.T.F.

868—COOPER, J. I., 1971. "The distribution in Scotland of tobacco rattle virus and its nematode vectors in relation to soil type." *Pl. Path.,* 20 (2), 51–58.

Tobacco rattle virus (TRV), a cause of spraing in potatoes, was found in 68% of light soils surveyed in Scotland and was associated with *Trichodorus* spp. *T. primitivus* and/or *T. pachydermus* were present in all TRV soils and *T. cylindricus, T. nanus* and an unidentified species were found in a few of them. The only species previously recorded from Scotland is *T. primitivus*. Because many of the soils containing *Trichodorus* spp. are deficient in copper and manganese, *T. pachydermus, T. primitivus* and *T. cylindricus* were exposed for 36 hours to solutions of cupric sulphate or manganous sulphate to find out whether they were sensitive to these chemicals. All nematodes became immobile in 16 p.p.m. solution of cupric sulphate; 15 of 18 *T. pachydermus* and 8 of 15 *T. cylindricus* were immobile in 4 p.p.m. and smaller numbers in 1 p.p.m. solutions, while *T. primitivus* remained mobile. Manganous sulphate solution had no obvious effect at the concentrations tested. Other soil nematodes were affected by neither chemical. Applications of copper and manganese to field soils did not decrease numbers of *Trichodorus*. Tables give the estimated incidence of *Trichodorus* spp. in Scottish potato-growing counties and of *Trichodorus* spp. and TRV on different types of arable soil in Scotland. M.T.F.

1159—HARRISON, B. D., 1971. "Some recent work on fungus-transmitted and nematode-transmitted viruses." *British Insecticide and Fungicide Conference (6th), Brighton,* November 15–18, 1971. Proceedings, Vol. 3, pp. 751–757. [En] Scottish Horticultural Research Inst., Invergowrie, Dundee, UK.

Work on prevention of virus diseases of crops by control of the nematode vectors is reviewed. Spraing in potatoes, transmitted by *Trichodorus*, may be controlled in the first season by D-D, dazomet or methomyl. Applications in autumn are more effective than in spring. Numbers of *Trichodorus* increase after the first year. M.T.F.

322—SHEPHERD, F. W., 1971. "Cane fruits." *Bull. Minist. Agric. Fish. Fd, Lond.,* 4th edit., No. 156, v + 36 pp.

Reference is made to the transmission of leaf curl disease due to raspberry ringspot virus (RRV) by *Longidorus elongatus* in Scotland, and *L. macrosoma* in England, and of raspberry yellow dwarf disease due to arabis mosaic virus (AMV) by *Xiphinema diversicaudatum*. In Scotland, strawberry latent ringspot virus also causes yellow blotching of raspberry leaves and is transmitted by *X. diversicaudatum*. RRV and AMV are common in weeds. Control of the vector nematodes with D-D and of weeds gives protection against virus infection for a time. M.T.F.

*90—HEWITT, W. B., 1971. [Virus diseases of the vine. Symptoms. Method of dissemination and geographic distribution.] "Les maladies à virus de la vigne. Symptômes. Mode de dissémination et répartition géographique." *Bull. Off. int. Vin,* 44, 97–125.

[Review with list of viruses and vectors. 208 references.]

659—BRITAIN, 1971. "East Malling Research Station. Report for 1970." *East Malling:* xii + 190 pp. [Plant nematodes pp. 116–118, 127–128.] [En]

In experiments, the hop strain of arabis mosaic virus has been transmitted by *Xiphinema diversicaudatum* both to hops and to *Chenopodium* spp. *X. diversicaudatum* has been found to concentrate round the main root system of hops in the field and in observation boxes, but it does not aggregate at root tips. Some *Xiphinema* and many *Longidorus* were found in permanent pasture soil adjacent to a nettlehead-infected site. Autumn application of D-D resulted in control of nematodes and reduction in the incidence of nettlehead disease and arabis mosaic virus in hops. The addition of quintozene to D-D improved the results but it was ineffective alone. Dazomet was intermediate in effectiveness between D-D and quintozene. A 20% solution of methylisothiocyanate in dichloropropene gave good control of nematodes. Chloropicrin injected to a depth of 4 in. was better retained in soil by means of polythene sheeting than by rolling but at a depth of 8 in. there was no difference. M.T.F.

657—BRITAIN, 1970. "East Malling Research Station. Report for 1969." *East Malling:* xxvi + 199 pp. [Plant nematodes pp. 55–56, 61–62.] [En]

The association of arabis mosaic virus which is implicated in several virus diseases of hops with *Xiphinema diversicaudatum* is suggested by results of several field experiments on the spread of these diseases. In laboratory experiments, however, convincing evidence of transmission has been difficult to obtain. In field trials, D-D and a solution of methyl isothiocyanate in dichloropropene have given good control of *X. diversicaudatum* but, in the laboratory, aldicarb and methomyl were ineffective. The life-cycle and reproduction of *Trichodorus viruliferus* on apple roots have been studied in the laboratory. M.T.F.

630—MAI, W. F.; ABAWI, G. S., 1971. "Effectiveness of the double-plant and nematode-transfer techniques for testing transmission of tobacco rattle virus by *Trichodorus christiei* at 20, 25 and 30 C." [Abstract.] *J. Nematol.,* 3 (4), 316–317. [En] Dept. of Plant Pathology, Cornell Univ., Ithaca, NY 14850, USA.

612—RASKI, D. J.; HEWITT, W. B.; SCHMITT, R. V., 1971. "Controlling fanleaf virus-dagger nematode disease complex in vineyards by soil fumigation." *Calif. Agric.,* 25 (4), 11–14. [En] Dept. of Nematology, Univ. of California, Davis, California, USA.

Experiments with 1,3-D fumigation against the grapevine fanleaf virus in California, USA, are described. High-rate, deep-placement application of 1,3-D has given good control of the virus and of the vector, *Xiphinema index*, for up to 3 years. A dose of 250 U.S. gal. per acre is recommended, particularly on heavy soils. At 200 gal. per acre 1,3-D was effective on lighter soils but 150 gal. per acre did not eliminate the nematode. Adequate soil preparation for fumigation is stressed. J.H.B.

403—DALMASSO, A., 1971. [Nematicidal soil treatment for the prevention of infectious degeneration in the vine.] "La désinfection nématicide du sol dans la prévention de la dégénérescence infectieuse de la vigne." *Un. Agric.,* No. 315, pp. 55–66. [Fr] Stn de Recherches sur les Nématodes, INRA, Antibes, France.

An account is given of virus diseases of vines in France and the nematode vectors. "Infectious degeneration" is a virus complex including "court noué" and arabis mosaïque virus, the first transmitted by *Xiphinema index* and *X. italiae*, the second by *X. diversicaudatum*. The morphology, biology and geographical distribution of the nematodes are given with a map of the distribution in France of *X. index*. Control of the nematodes in vineyards by nematicides such as D-D is recommended and means of applying the nematicide are described. M.T.F.

407—IWAKI, M.; KOMURO, Y., 1971. [Viruses isolated from narcissus (*Narcissus* spp.) in Japan. II. Tomato ringspot virus and its transmission by *Xiphinema americanum*.] *Ann. phytopath. Soc. Japan*, 37 (2), 108–116. [Ja, en] Inst. for Plant Virus Research, Chiba, Japan.

942—WESTERN, J. H. [Editor], 1971. "Diseases of crop plants." *London, UK: Macmillan*, xii+404 pp. [En]

Named plant-parasitic nematodes are mentioned as seed-borne, as associated with *Verticillium* disease of potatoes and as vectors of viruses causing disease in potato, sugar-beet, pea, grasses and possibly in hops. M.T.F.

745—PROTA, U., 1971. [Observations and research on grape-vine viroses in Sardinia with particular reference to 'Yellow mosaic'.] "Osservazioni e ricerche sulle virosi della Vite in Sardegna con particolare riguardo al 'mosaico giallo'." *Studi Sassaresi*, Sezione 3, 18, 153–178. [It, en] Istituto di Patologia vegetale dell'Univ. di Sassari, Sardinia.

In an extensive survey of virus diseases of grapevine in Sardinia, particular note was taken of the presence of the vector nematode *Xiphinema index*. Numerous specimens were found in soil with virus-diseased vines, but detailed results are not given. M.T.F.

*740—HEWITT, W. B., 1970. [Present knowledge on virus diseases of grapevine. Geographical distribution, symptoms, properties, mode of transmission.] "Connaissances actuelles sur les viroses de la vigne. Répartition géographique, symptômes, propriété des virus, mode de transmission." *Progrès Agricole et Viticole*, 87 (13), 282–292. [Fr]

743—KOMURO, Y.; YOSHINO, M.; ICHINOHE, M., 1970. [Tobacco rattle virus isolated from aster showing ringspot syndrome and its transmission by *Trichodorus minor* Colbran.] *Annals of the Phytopathological Society of Japan*, 36 (1), 17–26. [Ja, en] Inst. for Plant Virus Research, Chiba, Japan.

Tobacco rattle virus, isolated from aster showing a yellow ringspot disease, was transmitted experimentally by *Trichodorus minor*. The nematode was present in the fields in soil from round infected aster plants. The virus was also recovered from spinach grown in the infected fields but not from pea, cabbage or maize. [From English summary.] M.T.F.

*736—GOSWAMI, B. K.; RAYCHAUDHURI, S. P.; KHURANNA, S. M. P., 1971. "Changes in vitamin C content of fruit in nematode resistant and susceptible tomato varieties with infection of nematode and/or tobacco mosaic virus." *Zeitschrift für PflanzenKrankheiten und PflanzenSchutz*, 78 (6), 355–356. [En] Div. of Mycology and Plant Pathology, I.A.R.I., New Delhi 12, India.

Varieties of tomato "Pusa Ruby", susceptible, and "Neemamukta" (SL120) resistant to the root-knot nematode *Meloidogyne incognita* and both equally susceptible to the "Potato Phulva" of TMV were used to study the difference in vitamin C content of fruits in plants infected with the nematode and/or the virus. Vitamin C content was reduced by both pathogens separately and together. The reduction of vitamin C in the resistant variety Neemamukta, was less both with the nematode alone and with nematode plus TMV. Maximum reduction in the vitamin content was induced by the nematode-virus complex. C.E.S.

235 BRITAIN: ROSEMAUND EXPERIMENTAL HUSBANDRY FARM. **Report and Farm Guide 1972.** London: Ministry of Agriculture, Fisheries & Food. (1972) 70 pp. [En, Plant nematology pp. 38-40]

Trials are in progress on the commercial application of D-D to control *Xiphinema diversicaudatum*, the vector of the hop strain of Arabis mosaic virus, to assess the effects of D-D and Di-Trapex in reducing *X. diversicaudatum* and to record the *X. diversicaudatum* population changes on hops. BG

233 BRITAIN, EAST MALLING RESEARCH STATION. **Report for 1971.** Maidstone, UK. (1972) xii + 190 pp. [En, Plant nematodes pp. 124-125; 135-136. , Price £1.25]

The hop strain of arabis mosaic virus was transmitted experimentally by *Xiphinema diversicaudatum* to hops and herbaceous plants: some hop seedlings developed typical nettlehead symptoms. After a long bare fallow, following the removal of virus-infected hops, replanted hops were less infected than those replanted after a year or less of bare fallow. Fallowing had little effect on nematode numbers but seemed to influence their infectivity. Weeds shown to be susceptible to AMV and also good hosts of *X. diversicaudatum* are potentially important in the ecology of nettlehead disease. Good control of *X. diversicaudatum* by D-D at 50 or 75 gal per acre was obtained at 6 to 12 in but was less effective below 12 in. In 2 years under ryegrass, populations of *X. diversicaudatum* increased but under hops or strawberries there was little change. *X. diversicaudatum, Longidorus caespiticola* and *L. leptocephalus* transmitted an English strain of raspberry ringspot virus to petunia in pot experiments. The virus persisted in *X. diversicaudatum* for 26 but not for 40 days.

[See also *Hm/B 42*, 62.] MTF

61 TAYLOR, C. E. Nematode transmission of plant viruses. *Pest Articles & News Summaries* (1972) 18 (3) 269-282 [En] Scottish Horticultural Research Inst., Invergowrie, Dundee, UK.

This detailed review of the nematode-transmitted viruses of plants includes a survey of the viruses (which are classified as nepo- or tobraviruses), the plants they infect and the nematode vectors. This information is tabulated and virus symptoms are illustrated. The means of transmission and the persistence of virus in the nematodes are discussed and a diagram illustrates the soil types in which the different nematode species are found. Control of the spread of virus diseases of plants is mainly by the use of nematicides. There are 96 references. MTF

62 THRESH, J. M.; PITCHER, R. S.; MCNAMARA, D. G.; ORMEROD, P. J. The spread and control of nettlehead and related diseases of hop. In *Report of the East Malling Research Station for 1971.* (1972) 155-162 [En] East Malling Research Stn., Maidstone, Kent, UK.

Descriptions are given of the hop diseases called split leaf blotch and nettlehead, and the condition known as bare bine or spidery hop, all of which are associated with arabis mosaic virus transmitted by *Xiphinema diversicaudatum*.

Control of the diseases depends on the selection of clean stock and on the careful choice of planting sites which should be free from infestation by *X. diversicaudatum*. The nematodes may be eliminated by fallowing or by D-D soil fumigation. MTF

328 TEKINEL, N.; DOLAR, M. S.; NAZ, Z.; BILGIN, N.; SALIH, H.; SALCAN, Y. [A study of infectious degeneration (fanleaf) in vineyards of the Mediterranean region.] Akdeniz bölgesi bağlarinda bulaşik soysuzlaşma (fanleaf) 'nin araştirilmasi. *Bitki Koruma Bült* (1971) 11 (4) 225-246 [Tr, en] Plant Protection Inst., Adana, Turkey. From *Review of Plant Pathology 51*, 4236.

Xiphinmea index was found at all sites in Turkey where grapevine fanleaf virus was observed: *X. americanum* was found in one district. MTF

329 THOMAS, W.; PROCTER, C. H. Arabis mosaic virus in *Cyphomandra betaceae* Sendt. *New Zealand Journal of Agricultural Research* (1972) 15 (2) 395-404 [En] Plant Diseases Div., DSIR, Private Bag, Auckland, New Zealand.

Arabis mosaic virus in association with its vector *Xiphinema diversicaudatum* is recorded for the first time from New Zealand. The virus was found occurring naturally on tamarillos, *Cyphomandra betaceae*. The nematode was present in only small quantities but was regularly associated with the virus-infected tamarillo plants. PSG

330 VUITTENEZ, A.; KUSZALA, J. [Arabis mosaic virus associated with an enation disease of kirsch cherry (*Prunus avium* L.) varieties in the Vosges.] Le virus de la mosaïque de l'arabis associé à une maladie à 'énations du cerisier' *(Prunus avium L.) chez les variétés à kirsch de la région des Vosges. Annales de Phytopathologie* (1971) 3 (4) 485-491 [Fr, en] Stn. de Pathologie Végétale, Centre de Recherches, INRA, 68 – Colmar, France.

Symptoms of disease local kirsch varieties of cherry (*Prunus aviuni*) in the Vosges mountains, France, were found to be associated with arabis mosaic virus and *Xiphinema diversicaudatum*. MTF

323 PUTZ, C. [Virus diseases of small fruits. II. Virus diseases of currants.] Les viroses des petits fruits. II. Les viroses du cassis et des groseilliers. *Annales de Phytopathologie* (1972) 4 (1) 59-75 [Fr, en] Stn. de Pathologie végétale, Centre de Recherches, I.N.R.A., 68 - Colmar, France.

Nematode-transmitted viruses of *Ribes* are of little economic importance in France. MTF

319 BRUNT, A. A. Occurrence and importance of viruses infecting narcissus in Britain. [Int. Symp. on Flowerbulbs (1st), Inst. Soc. Horti. Sci., Noordwijk/Lisse, 30 Mar. – 4 Apr., 1970.]. *Acta Horticulturae* (1971) 2 (23) 292-299 [En] Glasshouse Crops Research Inst., Littlehampton, Sussex, U.K.

Of the 12 viruses known to infect narcissus in Britain 5 are transmitted by nematodes: *Trichodorus* probably spreads tobacco rattle virus and *Longidorus* and *Xiphinema* transmit arabis mosaic, strawberry latent ringspot, tomato black ring and raspberry ringspot. MTF

317 ALFARO GARCIA, A. [The presence in Spain of the 'fanleaf' virus on vines.] Presencia en España del virus del 'fanleaf' de la vid. *Anales del Instituto Nacional de Investigaciones Agrarias, Serie Protección Vegetal* (1971) 1, 71-80 [Es, en]

Xiphinema index was commonly found at a density of 28/100 cc in soil from around grape fanleaf virus (GFLV) infected vines at Jerez de la Frontera, Spain. The de Manian formula is given. *X. mediterraneum* was also found but not *X. italiae*. Experiments established that this Spanish virus was easily transmitted by Californian *X. index* and that *Chenopodium quinoa, C. amaranticolor* and *Gomphrena globosa* were good virus hosts. This is the first record of GFLV in Spain. PSG

ANNOTATED BIBLIOGRAPHIES	Period covered	Number of References	Price $	Price £
1. Cysticercus ovis and Taenia ovis	1932-69	59	1.30	0.50
2. Taenia saginata and T. solium in Lebanon, Turkey and Yugoslavia	1932-69	50	1.30	0.50
3. Helminthology in Iraq	1932-69	71	1.80	0.70
4. Humpsore (Stephanofilariasis) in domestic animals	1932-69	71	1.80	0.70
5. Skin lesions in domestic animals caused by Elaeophora, Rhabditis & Parafilaria	1932-69	55	1.30	0.50
6. Helminths and plant nematodes of Morocco	1932-70	111	2.60	1.00
7. Angiostrongylus	1932-71	210	7.00	2.70
8. Factors influencing the development of Ascaris eggs	1932-71	120	3.10	1.20
9. Helminths in archaeological and pre-historic deposits	1910-72	32	1.30	0.50
0. Neurological involvement in Trichinella spiralis infection in man	1932-70	51	1.60	0.60
1. White tip disease (Aphelenchoides besseyi) of rice in Africa and the tropics	1913-72	150	6.20	2.40
2. Helminths in dogs in Japan	1960-72	89	2.60	1.00
3. Nematodes on soybean (Glycine max)	1932-72	184	5.70	2.20
4. Oswaldocruzia (Nematoda)	1930-73	29	1.30	0.50
5. Transmission of plant viruses by nematodes	1930-73	120	3.10	1.20
6. Plant nematology in Venezuela	1932-72	21	1.30	0.50
7. Diorchis	1931-72	46	3.10	1.20

These can be obtained from the Commonwealth Institute of Helminthology, The White House, 103 St. Peter's Street, St. Albans, Herts, England.